Sanget Area 2
Sanget, Ill

URS

Date August 18, 2003
Name CA 725 Current Human Exposures Env. Ind.
Project No 21561197.00002

TO [redacted]
ADDRESS USEPA
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Chicago, IL 60604

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REMARKS

COPY file
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FROM Marian Rubel Fox
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Documentation of Environmental Indicator Determination
in accordance with EPA Interim Final Guidance 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRA Info code (CA725)

Current Human Exposures Under Control

Introductory Note:
Information in yellow highlighting represents Solutia information that has been added to the CA-725 form. Supporting information includes 9 tables, 10 figures, and 4 attachments.

Facility Name: Solutia W.G. Krummrich Plant
Facility Address: 500 Monsanto Avenue, Sauget, IL 62206-1198
Facility EPA ID #: ILD000802702

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   __✓__ If yes - check here and continue with #2 below.

   _____ If no - re-evaluate existing data, or

   _____ If data are not available skip to #6 and enter "IN" (more information needed) status code.

The W.G. Krummrich (WGK) Plant and surrounding features are shown on the aerial photograph included as **Figure 1**. The Hazardous Waste Management Units (HWMUs) are identified in **Figure 2** and the Solid Waste Management Units (SWMUs) are identified in **Figure 3.** Possible Areas of Concern (AOCs) that were identified by USEPA are shown on **Figure 4**.

Information on the SWMUs and HWMUs is presented in the attached **Table 1.**

The SWMUs, HWMUs and possible AOCs are located on the Main Plant or on Lot F. There are no SWMUs, AOCs, or HWMUs on the River Terminal property. As such, and for the purposes of this EI, the facility is considered to be the Main Plant and Lot F. However, it is noted that the former River Terminal facilities will all be located behind the barrier wall that is being constructed at Site R (refer to Figure 1). In consequence, any potential groundwater impacts from these facilities will be controlled by the Groundwater Migration Control System. The other routes of human exposure at the River Terminal facilities are controlled by the fact that the present site grade is one or more feet higher than the grade that existed when the terminal operated. During the decommissioning, the facilities were

all dismantled below grade and the ground surface was covered with gravel. Further, access to the site is controlled and the entire site is fenced, including the portion along the river bank.

The primary sources of information concerning these SWMUs, HWMUs, and sitewide groundwater are the *Description of Current Conditions* Report (DOCC) dated September 2000, and the *Status Report, Hazardous Waste Management Unit Closures*, October 29, 1998.

BACKGROUND

Definition of Environmental Indicators (for RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EIs are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in the RCRA Info national database ONLY as long as they remain true (i.e., RCRA Info status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria [e.g., Maximum Contaminant Levels (MCLs), the maximum permissible level of a contaminant in water delivered to any user of a public water system under the Safe Drinking Water Act]) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	✓			See Rationale and References section below, Tables 2 and 3.
Surface Soil (e.g., <2 ft)	✓			See Rationale and References section below, Tables 4 and 5
Subsurf. Soil (e.g., >2 ft)	✓			See Rationale and References section below, Tables 4 and 5
Air (indoors)		✓		See Rationale and References section below, Tables 6 – 9
Air (outdoors)		✓		See Rationale and References section below, Tables 6 - 9
Surface Water		NA		No surface water bodies present on site.
Sediment		NA		No sediment present on site.

_____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__✓__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Groundwater

The primary source of data for use in this EI is groundwater sampling events conducted in 1999 and 2000 (DOCC report, 2000). Groundwater sample locations are shown on **Figure 5**.

The attached **Tables 2 and 3** identify analytes in groundwater samples from onsite and offsite wells collected in events between 1999 and 2002 that exceeded human health-based screening criteria (e.g., Illinois *Tiered Approach to Corrective Action Objectives* (TACO) groundwater remediation objectives for Class I groundwater). The tables are organized into the three hydrostratigraphic zones that underlie the area: 1) the shallow zone that extends from the water table, at approximately El 395 ft, MSL, down to approximately El 380; 2) the intermediate zone between approximately El 380 and El 350; and 3) the deep zone that extends from approximately El 350 to bedrock (± El 300). Key analytes in one or more of these zones include VOCs, e.g. benzene, chlorobenzene, and SVOCs, e.g.,phenols, dichlorobenzenes, chloroanilines.

Soil

Surface and subsurface soil samples were collected between 1998 and 2000 as part of the RCRA closure assessments at the HWMUs (**Figure 6**). In addition, sampling was conducted in the Spring of 2003 for Phase I of the Corrective Measures Study (CMS). Samples were collected from locations in the AOCs defined by USEPA and in other areas to provide representative coverage over the site (**Figure 7**). **Tables 4** and **5** present the results of samples that exceeded screening criteria for HWMUs and CMS locations, respectively. Screening criteria were primarily TACO Tier 1 values for the ingestion and inhalation pathways for commercial/industrial properties. For PCBs, the individual Aroclor results were summed, and the total PCB value was compared to 25 mg/kg, based on guidelines for low occupancy areas contained in the Toxic Substances Control Act (TSCA) regulations. For certain other constituents (chlorobenzene, xylenes, naphthalene, pentachlorophenol and lead), Tier 2 values were developed using TACO methodology. Documentation for Tier 2 values is presented in **Attachment A**.

Indoor and Outdoor Air

Sampling was conducted in the Spring of 2003 to evaluate the potential impact associated with volatilization of vapors from groundwater into indoor and outdoor air. Sample locations are shown on **Figure 8**.

- The majority of the enclosed buildings on the site are plant control room structures. The buildings have all been replaced over the past several years and the new structures are designed such that the floor slabs are elevated above the surrounding grade by approximately two feet. In addition, the buildings are all equipped with high volume filtered air exchange systems such that a small positive pressure is maintained within the building. Details of the foundation and HVAC systems for the various control structures are shown on the drawings included in **Attachment B**. Because of this design, it is considered highly unlikely that the indoor air quality in these buildings would be affected by intrusion of organic vapors from subsurface sources. Accordingly, none of these buildings were selected for sampling. Rather, indoor air samples were collected from four older plant buildings that do not have the high volume air exchange present in newer buildings, and that are routinely occupied by workers. Two of these buildings, the BBZ and BBG structures, also happen to be located in areas of heavily impacted groundwater, while a third building, the

BK office structure, is the only one at the facility with a basement. Indoor air samples were analyzed for VOCs and SVOCs. The results, summarized in **Table 6**, indicated no concentrations above the most relevant criteria, Occupational Health and Safety Administration (OSHA) Permissible Exposure Limits (PELs). Table 6 also compares the measured indoor air concentrations to target levels defined in a recently issued USEPA draft guidance document titled "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)" (67 FR 71169). Samples from two buildings exceeded the target concentrations identified in this guidance. However, the comparison to the target indoor air concentrations is not considered to be the appropriate measure of risk evaluation in this case. The guidance document notes that "...EPA does not expect this guidance to be used in settings that are primarily occupational." It further notes that, "OSHA and EPA have agreed that OSHA generally will take the lead role in addressing occupational exposures." Consequently, the OSHA PELs are considered to be more appropriate for evaluating worker risks arising from exposure to indoor air. Moreover, the target indoor air concentrations listed in Table 2 of the guidance document are based on application of a model in which the receptors at the surface are residents in homes. Thus, the target concentrations in Table 2 are more applicable to a residential exposure than to an occupational scenario. Further, the constituents detected in the buildings were either not detected or were present at very low concentrations in nearby soil vapor samples. In fact, benzene, chlorobenzene, or isomers of dichlorobenzene (the largest components of the plumes in groundwater below the site) were not found in significant amounts in any of the buildings. The amounts found were slightly above the detection limits and were probably from the ambient air. As such, the source of these detections was concluded to be ambient (outdoor) air or a source within the buildings themselves.

- Soil vapor samples were collected from 15 locations distributed throughout the plant, as shown on **Figure 8**. The results are summarized in **Table 7**. The results identified five locations where results exceeded the target concentrations included in EPA's subsurface vapor intrusion guidance. These target concentrations are considered to be screening levels for the potential for intrusion of the specific compounds into overlying or immediately adjacent buildings. However, it is emphasized that the screening is only relevant as an indicator of the possible intrusion into adjacent buildings. If no buildings are in the immediate vicinity of the sample location, or if sampling in an adjacent building does not result in the detection of the screened compound, then the screening exercise is not an appropriate indicator of possible human health risk.

Of the five locations where soil vapor samples contained chemical constituents above the relevant screening level, only one location was in immediate proximity to a building. This location, SVP-6, is immediately across the street from the BK office building and the sample at this location contained tetrachloroethene (PCE) above the screening level. However, PCE was not detected in indoor air samples in the BK building, indicating that soil vapor intruding into the building is not transporting organic vapors at measurable concentrations.

In summary, therefore, the constituents detected in the soil vapor samples were either not detected in ambient air samples, or were detected at concentrations below any level of concern. In addition, they were not detected in indoor air samples above screening levels. Consequently, these detections are not judged to pose a concern to receptors at the site

Soil vapor sampling was also conducted along the benzene pipeline that traverses Lot F. The results showed no detections of benzene, and only very low concentrations of other analytes (**Table 8**).

- Outdoor air samples were collected from four locations throughout the plant. The results, shown in **Table 9**, were all well below applicable criteria.

The results of these investigations clearly indicate that indoor and outdoor air are not "contaminated" as defined for the EI. A copy of the air sampling report is included as **Attachment C.**

Footnotes:

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggests that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

3. Are there ***complete pathways*** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

	Residents	Workers	Day-Care	Excavation/ Construction	Trespassers	Recreation	Food
Groundwater	No	No	No	No	No	No	No
~~Air (Indoors)~~	---	---	---	---	---	---	---
Soil (surface, e.g., <2 ft)	No	No	No	No	No	No	No
~~Surface Water~~	---	---	---	---	---	---	---
~~Sediment~~	---	---	---	---	---	---	---
Soil (subsurface e.g., >2 ft)	No	No	No	No	No	No	No
~~Air (Outdoors)~~	---	---	---	---	---	---	---

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media - Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

__✓__ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

_____ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

Currently, and for the foreseeable future, there are no complete exposure pathways for a number of receptors of concern. Specifically, the following exposure pathways and receptors can be eliminated from further consideration:

- **Groundwater Use**: The consumptive use of groundwater in the Village of Sauget is forbidden by Ordinance.
- **Residents**: The facility is located within a heavily industrialized and commercialized area. The closest residential areas are at least 1/2 mile from the facility boundaries and none of these residences is located downgradient of the facility.
- **Day-Care**: The nearest day-care facilities are over 1.5 miles from the facility.
- **Recreation**: The nearest recreational park is over 1/4 mile from the facility and is upgradient of the facility.
- **Food**: Food crops (commercial scale) are not grown in this area.
- **Trespassers**: Trespassing at this facility has never been a problem in the past. The site is completely fenced and there is 24 hr/day security, including continuous video surveillance. Also, there are no special land features, water bodies or wildlife that would cause the facility to be attractive to trespassers.

Thus, the only receptors and pathways that remain to be considered are worker exposure to groundwater, surface soils, and subsurface soils. Each of these is evaluated below.

- **Worker Exposure to Groundwater:** Since the consumptive use of groundwater is prohibited by ordinance in the Village of Sauget, the only remaining potential pathways for worker exposure to groundwater are direct contact and inhalation. Neither of these presents a completed pathway because of Solutia's excavation permit process. This process requires that Solutia's Environmental, Safety and Health (ESH) department issue a written permit for any intrusive work at the plant. As part of this process, Solutia reviews the planned scope of work considering all available subsurface information. Sampling and analyses may be conducted if available information is not sufficient to assess the potential hazards. The work is then authorized with necessary health and safety conditions and requirements. For example, the permit might require that the worker/contractor must conduct appropriate monitoring (almost always required), wear certain personal protective equipment (PPE), etc. As well, all workers on the facility are required to have appropriate health and safety training and are familiar with hazard recognition and response measures. A copy of the plant procedure is included in **Attachment D**.

  A completed groundwater pathway does exist for offsite workers (i.e., downgradient of WGK) since non-Solutia owned properties exist downgradient of the plant and Lot F. The exposure mechanisms associated with this pathway are direct contact and inhalation. However, because of the depth to groundwater, these risks are considered to be minimal. Groundwater is typically 18 feet or more below the surface downgradient of the facility. This is deeper than known underground utilities

in the area. In consequence, it is unlikely that intrusive construction activity, such as utility trenches, will encounter groundwater. Further, soil vapor sampling carried out in this area along the benzene pipeline route did not disclose the presence of unacceptable levels of any organic constituents in the shallow soils. Consequently, groundwater will not present unacceptable risks to the vast majority of offsite workers. In order to eliminate any small remaining risks associated with this pathway, institutional controls will be implemented to minimize the risk to workers involved in deep subsurface construction. At a minimum, these controls will include letters by certified mail notifying the property owners downgradient of the plant about the risks associated with deep excavations on their properties and the potential need for personnel protection for workers involved in such excavation activities.

- **Worker Exposure to Soils:** Exposure to impacted soils at the Main Plant is not a complete pathway for site workers. For surface soils (<2 ft), ground cover materials prevent the potential for incidental contact and excavation is controlled by the excavation permit policy. **Figure 9** shows the various types of surface cover on the facility, excluding Lot F (which is grass covered). A significant portion of the plant is covered by relatively impermeable materials (e.g., asphalt, concrete, structures, etc). The balance of the area is covered by gravel at the surface. A survey was conducted to assess the thickness of gravel present across the site. A report of this work is included in **Attachment E** and the results are shown in **Figure 10**. These results indicate a minimum thickness of 12 inches in most areas, with over 24 inches in places. It is considered that 12 inches of cover material is sufficient to preclude incidental exposure to underlying materials under current site conditions and uses. Such a thickness is sufficient to prevent accidental exposure of impacted soils as a result of routine activities such as rutting caused by heavy vehicles. The TSCA regulations provide some relevant guidance in that a soil cap 10 inches thick is adequate to prevent exposure to PCB wastes (40 CFR §761.61(a)(7)). Solutia is currently working to increase gravel thickness in certain areas based on the survey results, such that there will be a minimum of 12 inches of gravel in all gravel covered areas.

  Surface soils are also not of concern in those areas with grass cover (Lot F), and SWMU 19 in the northwest corner of the plant site. Shallow soil sampling in these areas did not detect any chemical constituents of concern. Four samples in Lot F contained PCBs at concentrations between 41 and 2,500 ug/kg. While these are above the TACO Tier 1 screening value, they are all well below the TSCA cleanup level of 25,000 ug/kg for unrestricted low-occupancy (industrial) use. One other surface sample in Lot F contained benzo(a)pyrene at a concentration of 1 mg/kg, while another contained barium and nickel at concentrations of 15,000 and 38,000 mg/kg respectively. While these concentrations exceed their respective TACO Tier 1 screening levels for industrial use, the fact is that employees are virtually never present in Lot F since there are no ongoing operations in this portion of the property. Consequently, the actual exposure frequency is well below that assumed for the typical industrial exposure scenario. Given that the concentration of benzo(a)pyrene and barium are only marginally in excess of the screening standards (1,000 vs. 800 ug/kg and 15,000 vs. 14,000 mg/kg, respectively), the

shallow soils at these sampling locations do not pose unacceptable risks from these constituents. The concentration of nickel in the one sample is significantly in excess of its TACO 1 screening level, however (38,000 vs. 4,100 mg/kg). The risks associated with this location are being evaluated and, if necessary, the soils at this location will be excavated to reduce the risk to an acceptable level.

Risks posed by exposure to subsurface soils (>2 feet deep) do not pose unacceptable risks to human health because of the excavation permit program. As is the case with the on-site groundwater exposure pathway, the need for excavation permits results in the requirement for worker protection and monitoring before any excavation is authorized.

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

   _____ If no (exposures cannot be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

   _____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

   _____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):_____

_____

_____

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable**

limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable") - continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s)

6. Check the appropriate RCRA Info status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

_✓___ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Solutia W.G. Krummrich Plant , EPA ID #_LD000802702, located at 500 Monsanto Avenue, Sauget, IL 62206 under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Completed by: (Signature)_____ Date _____
(Print)
(Title)

Supervisor: (Signature)_____ Date _____
(Print)
(Title)
(EPA Region or State)

Locations where References may be found:

Description of Current Conditions Report, Solutia W.G. Krummrich Plant, Sauget, Illinois, Draft September 1, 2000

Contact telephone and e-mail numbers

(Name)_____
(Phone #)_____
(E-mail)_____

Final Note: The Human Exposures EI is a Qualitative Screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk.

ref: ***ca725epa.doc***